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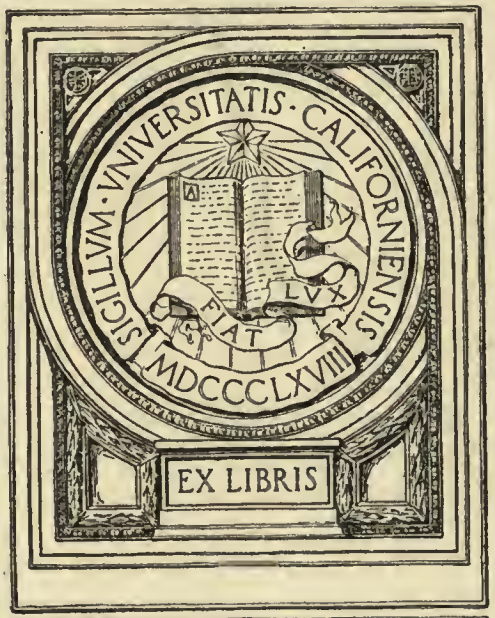
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Tourvielle; A Trade School for War Cripples

The first man in France to propose trade training for war cripples was Édouard Herriot, Mayor of Lyons, writing in the Paris *Journal* of November 23, 1914. On November 30, M. Herriot obtained the approval of the municipal council of Lyons for his plan to establish a school where disabled men could be taught new trades. On December 16, two weeks later, the school opened its doors.

This rudimentary school, improvised in an eighteenth century building belonging to the city, was typical of the energy with which M. Herriot carries out his plans. He might have waited until the plaster was thoroughly dry, the floors were well waxed, and all the benches in place, when, with the concierge at the door, the director in his office, the teachers at their desks, he could have received the pupils with proper ceremony; but M. Herriot does not like to wait. Instead, he seized by the hand the first pupil who appeared, led him into the midst of the confusion of boards, pipes, bags of lime, and cans of paint which covered the floors, and said to him, "Here is the school."

The difficulties which he encountered in organizing the school and the principles which guided him have been explained by M. Herriot in numerous articles and prefaces. They have been discussed in greater detail by Dr. Carle, the first physician-in-chief of the school, in *Les Écoles professionnelles de blessés*, a book so full of sound principles and practical suggestions that it has been a *vade-mecum* to all followers in the field. Dr. Carle shows clearly why trade training was chosen to solve the problem of the *mutilés*, and why the idea of placing them as apprentices with private employers was abandoned in favor of a school.

The first pupil, welcomed amid the rubbish left by painters and plasterers, was rapidly followed by others. In ever increasing numbers they came until the old building in the rue Rachais and the sheds built against its garden walls were full to overflowing. Not many weeks passed before it was apparent that a second school would have to be opened to keep up with the demands for admission.

To house his second school the Mayor of Lyons resolved to use an abandoned farm property which the city had recently acquired. This was situated on the outskirts of the city, on the chemin de Tourvielle, just where the suburbs fray off into the open country, and consisted of fourteen acres of land and a dilapidated pile of buildings. Much had to be done to turn it into the semblance of a school, but nothing could daunt M. Herriot. With all the masons, carpenters, plasterers, tinsmiths, and painters he could collect, he set to work on the alterations. Windows and roofs were mended, new windows were cut, partitions were taken down, stairways were added. Light, air, and sanitation were introduced everywhere. By May 14, 1915, the classes in shoemaking could be transferred from the old school to the new, and new men could be received for training in horticulture. On June 2, the tailors were moved over, and on July 9 the carpenters, so that there remained at the rue Rachais only the classes in accountancy, bookbinding, and toy-making. On July 11, M. Justin Godart, Under-secretary of state for the medical service, formerly opened the École de Tourvielle.

The development of the new school paralleled that of the old. By October it had a hundred pupils and was obliged to turn away applicants. The Mayor and Board of Directors soon found

that they must either enlarge their plant or say to the victims of the recent campaigns in Artois and Flanders, "We are sorry, but you got your wounds too late." Facing this situation, they decided to open new courses and to build large wooden pavilions to house not only these but also the already established classes. By putting all the shop work in these new structures and using the old main building solely for a living hall, they could accommodate many more pupils. M. Herriot gave particular attention to the plans and insisted that each trade be housed in its own building by itself, in surroundings not only practical but pleasant. It is needless to say that his plans were carried out with the greatest despatch.

The new courses, added to the curriculum one after the other as the need arose, were in the manufacture of artificial limbs and orthopedic appliances, in wireless telegraphy, in making *galoches*, that is, crude peasant shoes with wooden soles and cloth tops, and in fur work.

A visitor to the school today, entering by a well-kept avenue bordered with ancient lindens, passes the experimental gardens, the stable, the greenhouse, the nursery, the orchard, and the rabbit warrens before coming to the main building. Alterations have not made the old structure a handsome building on the outside, but the interior is conveniently arranged and the rooms are large, high, and full of light. In the spacious entrance hall men are playing billiards; on one side are the dining-rooms and on the other the sleeping quarters of men for whom walking is difficult. Everything is not only scrupulously sanitary but comfortable and attractive. White spreads conceal the severity of the iron beds; there is a stand for every man in which he can keep his personal belongings; running water flows from nickel faucets into luxurious porcelain bowls.

Beyond the entrance hall is the infirmary, which has been fitted up by the class in carpentering with ample medicine cabinets, a table where nurses can change simple dressings, and a bed for a suspected case which needs to be isolated. Stretchers and discarded crutches stand in the corners, silent witnesses to the victories of prosthesis. The other sleeping rooms are reached by the broad stairway; the kitchens, by going through the main dining-room. A private stairway leads to the director's office, to which the pupils always have free access. Baths and showers are in a little separate building.

To reach the workshops, the visitor goes through the horticultural gardens to the 'village', which at present consists of eight separate wooden structures or pavilions, each one named after the person or association whose philanthropy made its construction possible. There is, for instance, the pavilion Hauvette-Michelin, named after Mme. Hauvette-Michelin, the pavilion of the Arsenal, so named because the employees of the arsenal support it by their monthly contribution, and the pavilion of the Electric Light Workers. A sign placed underneath indicates the trade taught there. Two pavilions are given over to the manufacture of orthopedic and prosthetic appliances, the iron work and the fitting being done in one, and the wood and leather work in the other. One pavilion is for making shoes and one for *galoches*. The pavilion for wireless telegraphy contains also a lecture room, where men from all the trades unite in the evening. The tailors have divided their pavilion into a work room, a cutting room, and a little salon for trying on, which has been attractively equipped by their companions, the cabinet-makers. The cabinet-makers' own shop is of course all that could be desired. In the same pavilion with the furriers' shop, which is a reduced model of the workroom of the great Lyons fur houses, are the draughting room and a lecture room for the horticulturists. All are spacious, well-ventilated buildings, warmed by huge stoves, lighted by electricity, and equipped with electric power for machines.

When they were first organized, both of the Lyons schools for disabled soldiers were in city-owned buildings and were closely connected with the city administration, but they had an independent budget. Since April 1, 1917, their receipts and expenses have been incorporated in the municipal budget. Control of the general policy of the two schools is vested in a board of directors appointed by the Mayor. From a military and medical point of view the two schools constitute one institution, 'Auxiliary Municipal Hospital No. 202', and have one military physi-

cian-in-chief, but for technical instruction each school has its own director. Requirements for admission and the rules of the house are formulated in a set of rules and regulations given below.

RULES AND REGULATIONS

Admission

The Lyons vocational schools for wounded soldiers are open to men whose disability puts them in one of the first five classes eligible for discharge with pension. Men from any part of France, from the colonies, and even from the allied nations are accepted, but preference is shown to applicants from Lyons or the vicinity and from the invaded departments.

Any wounded soldier who wishes to enter the school should send in his application to the Mayor of Lyons, or to the physician-in-chief of the schools, 41 rue Rachais, Lyons. He will receive in reply a questionnaire in the form shown below, which he should fill out and return to the physician-in-chief. His application will then be passed on by the physician-in-chief, acting for the board of directors, the decision being based on the former occupation of the candidate, his object in entering, his present physical capacity, and the places open.

Form of Questionnaire

1. Name
2. Born at on
3. Married children
4. Regiment company rank
5. Disability
6. When received What engagement?
7. Hospital
8. Are you discharged with pension? In what class?
9. Or recommended for discharge?
10. Have you an artificial limb or other appliance?
11. Former occupation
12. Desired occupation
    [List of trades taught is inserted here]
13. Have you an elementary school diploma?
14. Other diplomas
15. Present address
16. Home
17. Remarks and references

Signature place date

At the present time the following trades are taught in the two schools:

At the École Joffre . . . Bookkeeping, stenography, and typewriting
Paper box-making and book binding
Toy-making
Bead work

At the École de Tourvielle Shoemaking
Galoche-making
Tailoring
Carpentry and cabinet-making
Fur work
Manufacture of artificial limbs and orthopedic appliances
Wireless telegraphy
Horticulture

The average length of the course is six months for bead work; eight months for wireless telegraphy, galoche-making, and bookkeeping; one year for shoemaking, fur work, paper box-making and horticulture; and eighteen months for tailoring, carpentry, artificial limb making, and toy-making.

Support and Remuneration

In general, pupils are required to live in the school, but in exceptional cases they may attend as semi-boarders or as day pupils. Instruction, board, lodging, and clothing are furnished free of charge and no deduction is made from a man's pension. Pupils not yet drawing a pension or temporary allowance receive one franc a day, paid fortnightly, from the school.

Work turned out by the apprentices in a shop is paid for according to its worth, and the money is divided each month among the apprentices in proportion to their productive capacity. Before the division is made, however, fifteen per cent. of the total is deducted as the pupils' contribution to the running expenses of the shop.

Leaves, Vacations, and Permissions

No pupil living in the school can leave the grounds without permission, except on Sundays and holidays from seven in the morning to nine at night, and on Thursdays from one to nine. At Christmas and Easter the school has a week's vacation and in summer ten days. Rounds are made in the evenings of holidays, and any unexplained absence is punished.

Pupils receive uniforms from the school which they are required to wear both inside and outside the walls. They must salute officers, and they can enter cafés and restaurants only under the same conditions as soldiers in hospital. If they have not yet been pensioned, they can travel at the military rate; if they are drawing their pension, they can travel on half fare when going to their homes.

The school can send away any pupil whose work or conduct does not give entire satisfaction.

Rules of the House

Pupils rise at six in summer, six-thirty in winter and go to bed at half past nine. They work from eight to

twelve and from two to six. Breakfast is at seven, and consists of coffee, hot milk or soup, and bread with cheese or chocolate. Luncheon is at twelve-fifteen, and consists of meat, a vegetable, dessert, and a quarter liter of wine. Dinner is at six-fifteen, and with the addition of a thick soup is the same as luncheon.

All pupils are required to attend the classes in general schooling which are held from seven to eight every evening. A general library and special trade libraries are at all pupils' disposal.

After working hours pupils may do as they please except that they may not leave the grounds. They may play ball, cards, dominoes, etc. in the recreation rooms, or write their letters in a room reserved for that purpose. Games and writing paper are supplied to them for the asking. Pupils who have special permission may work in the shops after dinner till nine o'clock.

On account of the danger of fire, smoking in the shops is absolutely forbidden.

Visitors can be received after working hours and occasionally during work when the consent of the instructor has been obtained, but under no pretext can they make a long stay in the shops.

The school supplies each man with a wool uniform, a canvas uniform, a cloak, hat, shoes, underwear, and the necessary toilet articles. Fresh underwear is furnished every week, and each man is required to take a bath or shower once a week. The services of a barber are free.

Pupils are forbidden to enter the kitchen on any excuse or to pick any flower or fruit without the consent of the head gardener.

The foreman of each shop sees that discipline is maintained during working hours. He supervises the work of his pupils, when necessary urges them to greater efforts, sees that the rule against smoking is observed, and reprimands all whose conduct is unsatisfactory. Each evening he hands in to the director a report containing the list of absences, observations on the conduct and progress of his pupils, and suggestions as to changes in teaching methods or equipment. Each month he summarizes for the director the results obtained in his section, and determines how the profits of the shop should be divided on the basis of each pupil's productivity.

Pupils are advised to practise rigorous saving in order that when they leave they may have the necessary sum to set themselves up in their trade. It is to help them to accumulate such a sum that all instruction and maintenance are furnished free of charge, that their pensions are untouched, and the work they do as apprentices in the shops is paid for whether it is sold outside or not. Through the agency of the director savings may be deposited in the savings bank, invested in government bonds, or kept in the office safe. Any pupil or former pupil who has finished his course of apprenticeship in the school will receive the sum of 100 francs on the birth of a child.

By entering the school pupils bind themselves to observe these rules. For any infraction of the rules they will therefore be punished with disciplinary measures ranging from a warning through deprivation of privileges to expulsion. The administration has made the rules for the best interest of the pupils. It confides to them the good reputation of the school, and it hopes that they will be happy, industrious, and well-behaved.

EXPENSES AND RECEIPTS

The estimated budget for the École de Tourvielle amounts to 420,000 francs, divided as follows:

Administrative cost and general expenses	46,000
Food	160,000
Lodging	55,000
Teachers' salaries and cost of production	145,000
Miscellaneous	14,000

Part of the cost of production, which includes the purchase of raw materials and the wages paid to the workmen, is covered by the sale of the finished product. And the food item is slightly reduced by a sum paid to the school by the Army for the maintenance of certain soldiers assigned to the service of the school. After the total cost has been reduced by these amounts, the average cost per pupil per day is about five francs. Let us hope that it will be met by the allowance to the school from the medical service, the subventions from the national government, and from the department, and the gifts of individuals.

To hope that one day Tourvielle will contain facilities for functional therapy as well as for trade training—a combination which wherever it has been tried has produced splendid results—is perhaps too grandiose a dream. May we, at least, be enabled to build new dormitories and shops so that we can offer new courses, say, in saddlery and tinsmithing, and accommodate a great many more pupils. Those whom we have been obliged to turn away number hundreds. If, owing to the rebuff, they became discouraged and renounced their desire for training, the nation has lost just so much productive energy.

The gifts we have received up to now have been numerous and generous. Some have been magnificent; some peculiarly touching. They have come from Lyons and the vicinity, from all France, from Switzerland, from North Africa, from Madagascar. In the list of contributors published in the *Bulletin Municipal*, there are grouped together chauffeurs and judges, universities and associations of policemen, trade unions and great industrial firms. The appeals of the Mayor of Lyons have never been unanswered in the past; they surely will not fall on deaf ears now.

TRADES TAUGHT AT TOURVIELLE

Manufacture of Artificial Limbs

Although the manufacture of artificial limbs and orthopedic appliances was one of the last trades to be started at the École de Tourvielle, it has become one of the most useful and important. Indeed, the shop where it is taught renders now such indispensable services that one can hardly understand how the school managed to exist without it. It studies the needs of the workmen in the different trades, designs useful appliances for them, improves existing models, and executes any special device needed for a certain process. A shop for work of this kind should, it seems, be the nucleus of any school for disabled men. In exchange for the benefits which the pupils receive, they furnish the workmen on prostheses with useful suggestions and create a demand for the product of the shop. When the workmen in the trade are themselves maimed men, they can draw upon their own experience in devising modifications and improvements, and the product of the shop is so much the more useful.

The trade is a suitable one for men who have worked with iron, wood, or leather. In the shop at Tourvielle it employs the talents of mechanics, blacksmiths, wood and metal turners, saddlers, plaster modelers, and shoemakers. It is a well-paid trade, and at present the demand for the product far exceeds the supply.

The very complete equipment for the artificial limb work at Tourvielle was supplied by the Medical Service, which operates the shop as an adjunct to the Center of Surgical Equipment at Lyons. In order to ensure a good output fifteen trained workmen under army orders are employed in the shop, in addition to the twenty-seven apprentices from the school. Two foremen direct the work. The whole band works so energetically that they are able to turn out each month twenty artificial limbs of the type approved by the Government Commission, from twenty-five to thirty simpler appliances, and seventy to eighty orthopedic shoes, without counting repairs and special temporary appliances.

Several new appliances of acknowledged usefulness have been invented at Tourvielle. M. Louis Lumière has invented a special kind of 'universal pincers', which are very generally used in the Lyons Center of Equipment, and in other parts of France are competing with the pincers invented by Professor Amar and Dr. Estor. Dr. Bouget has constructed so-called 'automatic' pincers, worked by a movement of the opposite shoulder, which are extremely useful for men who have lost both arms, and two kinds of appliances for cases of radial paralysis. Workmen in the shops have designed other excellent models of arms and legs and a large number of tools and devices for special processes in the different trades. The jointed leg of hollowed wood, sometimes called the American leg, is preferred by almost all the men at Tourvielle to the leg of steel and leather furnished by the Government.

A majority of the apprentices in prosthetic work are men who have been injured in the leg. Two good hands seem indispensable for orthopedic boot work, which is largely done by men previously trained in the shoemaking section, but are not so necessary for the work in wood. In fact, a man with an ankylosed elbow was able to do excellent work with a lathe, and another with his right forearm amputated and a partially paralyzed left hand, aided by the Lumière pincers, used both the file and the lathe. Both men have been placed in good situations in artificial limb factories; the first at wood turning, the second as a mechanic. Ten other pupils up to date have finished their apprenticeship and are employed by artificial limb manufacturers of Lyons and Paris at wages varying from seventy-five centimes to one franc an hour.

Shoemaking

The course in shoemaking proper supplemented by orthopedic boot work and galoche-making offers well-rounded training in the shoemakers' craft to those who are willing to pass such a lengthy apprenticeship. Few men who come to the school want to go through this complete course, but there are more applications for plain shoemaking than for any other trade. Countrymen, especially, who have lost one or both legs, have often only one wish for the future—to become shoemakers, and efforts to direct them into another occupation are usually futile. They want to be able to go back to their native village with a trade which will make them independent, but which will not require a large outlay of capital. They want to live at home and have time to dig in the vegetable garden or to cultivate a few grapes. With a fair mastery of the cobbler's trade, a sober, industrious man can add from six to eight francs a day to his pension, and live comfortably in the country.

The first thing apprentices are taught to do is to make their own shoemaker's stirrup and glove. In doing that they learn how to make a waxed thread and to use the awl. Next they are directed to assemble and sew by hand the parts of a pair of slippers, which they are allowed to keep for their own. Coarse brogans are their next problem and then fine boots. After an apprentice has been working a month, he can feel that he is a shoemaker,—he has made a pair of shoes for sale. Doubtless he received help from the teacher on this first pair, but he will need less and less help as time goes on, and after a year, or ten months if he is skillful, he will need only the teaching which practice can give. Some final lessons on cut and style, on the selection of material, on the way to obtain customers, and on price-fixing will enable him to get along by himself under any conditions. If his disabilities are not too serious, he can also have some practice with shoe machinery, thanks to the 'United Shoe Machinery Company of France', which has given to the school the use of a repair bench.

When the school first organized its shop work, it was confronted with the problem of how to find a market for the finished product, but that difficulty did not exist for long. The modest orders which it secured at first grew steadily larger and more varied—a convincing proof of the skill of its apprentices. Orders for boots and shoes have been placed by the two schools, by the municipal administrations, by military units, by shoe dealers of Lyons, and by private persons. Consignments have been sent into the provinces and Switzerland. And up to May 31, 1917, the apprentices in the shop have received as payment for their work, divided in proportion to their capacity, the sum of 28,000 francs.

This sum shows the efficiency of the methods of production. A better proof of the value of the instruction is in the number of pupils placed in positions or established in their trade. On May 31, twenty-one men who had completed their course at the school were holding good positions, and twenty-seven were working for themselves. Twelve others, having finished their apprenticeship in the shoemaking section, were working on orthopedic boots in the artificial limb shop. The length of the course had been from ten to fifteen months. Before the war, out of these sixty shoemakers, thirty-four were farm laborers, four were masons, four miners, two weavers, two day laborers, one was a stone cutter, one a plasterer, one a road-mender, one a blacksmith, one a cabinet-maker, one a railroad employee, one a painter, one a laundryman, one a butcher, one a tripe-seller, one a nail-maker, one a coachman, one a delivery boy, and one a chauffeur. Two of them have lost both legs, one is helpless because of an injury to the pelvis, thirty-five have had their leg amputated at the thigh, eleven below the knee, one has lost his leg at the knee joint, two have had their sciatic nerve cut, one has had his thigh fractured, and two have been wounded in the feet.

Galoche-making

Galoche-making is a comparatively easy trade, can be learned in a short time, and brings a good return in many rural districts, whether it is practised by itself or in connection with cobbling, or on the side by a man who holds a small position as keeper or janitor. A good galòche-maker can turn out his twenty pairs a day, and earn from five to seven francs. The trade was installed at

Tourvielle through the agency of a manufacturer of Lyons, who equipped the shop and buys up its total output. From March 20, 1916, when the work was started to May 31, 1917, the shop has furnished him 25,000 pairs of galoches. All kinds of wooden-soled shoes which come under the term galoche have been made—common neopolitans, boots with heavy extension walnut soles, called 'American style', great arctics lined with cat fur for chauffeurs, and mules lined with red plush and raised on a Louis XV heel for fine ladies.

Men who have lost an arm are in general barred from this course, but two exceptions to this rule have been made. A man who had made wooden *sabots* before the war and was therefore familiar with the use of the scraper showed such determination to succeed that he was allowed to take up the work. He was fitted with a special appliance for holding his work and soon learned to turn out galoche soles with great rapidity. The second case was a man who had been a galoche-maker by trade and who needed, therefore, to accustom himself to his disability rather than to learn a new trade. His arm was off above the elbow, and he was forty-three years old, an age at which the thought of learning a new trade is repugnant to almost any man. Now with an appliance devised for him by Dr. Bouget, he is little by little recovering his old skill. His output will doubtless be less than it used to be, but it will certainly be sufficient to eke out his pension to the extent of his needs.

Tailoring

The tailors at Tourvielle have all been injured in their legs. One man who has lost the thumb and forefinger of his left hand tried to do the work but had to abandon it and return to his old life on the farm. When his companions have finished their course, they also intend to go back to their native villages, but they will go to make clothes for the villagers. They are all anxious to start in for themselves, but the school advises them to take a position for a time with a master-tailor. Under present conditions, with equipment and material high-priced and difficult to procure, and orders few and far between, the risk of failure is great, and the wiser course is to wait until better times. Meanwhile, they can grow used to dealing with customers and acquire other valuable experience.

The tailor's trade exacts a long apprenticeship —eighteen months, at least. The first lessons are in the use of the thimble and needle, and are designed to make the fingers supple and to teach the different stitches, basting, overcasting, chain stitch, back stitch, buttonhole stitch, etc. Next comes the construction of a pair of trousers, which the pupil works out for himself under the strict supervision, of course, of the foreman. After a few weeks he is put at a vest, then a blouse, a short coat, and so on, until he understands the construction of any garment and is a good sewer. When he has arrived at this point, he receives lessons in trying on and in cutting, which complete his course. That this method produces good results is attested by the satisfaction of the merchants of Lyons who have bought the output and by the goodlooking uniforms worn by the pupils of the school.

For equipment, the tailors' workroom contains six sewing machines, eight tables, two benches, cupboards, and heaters for pressing irons. The trying on salon is attractively furnished with polished walnut pieces, a carpet, and mirrors. In the cutting-room is a huge table covered with black serge, on which are traced cabalistic signs known only to the initiated.

Fur Work

The course in fur work was started at the request of a number of Lyons fur merchants, who were concerned over the shortage of workmen in the trade. They considered it a sound business measure as well as a humane and patriotic duty to create a supply of trained furriers to take the place of the Germans hitherto almost exclusively employed. The school was glad to open such a course, since the work is done seated and is therefore suitable for men with amputated or paralyzed legs. A committee composed of five of the leading fur merchants of the city aided the school in organizing the course by inviting visits to their shops, by furnishing plans, and by selecting a foreman. After the class was started, they continued their cooperation; they supplied skins on which the pupils could work, paid them

for their work, and promised definite positions to those who finished the course.

Men were at first required to complete a year's apprenticeship and were then employed at five francs a day, the wages usually paid to boys who have worked as apprentices for three years; but graduates of the course showed such proficiency that the time was reduced to ten months, and the beginning wages were raised to five francs fifty or even six francs. As a workman acquires more skill through experience, he can expect to earn seven, ten, or twelve francs a day. 'Equal pay for equal work' is the motto of the employers, and the school asks nothing more for its pupils. It intends to train workmen so well that they can compete on equal terms with normal men.

Carpentry and Cabinet-making

Carpentry has been found too arduous for disabled men and has been practically given up in favor of cabinet-making, which demands less physical effort. Cabinet-making can be practised by men with the left leg amputated, even if the amputation is above the knee, provided a good stump remains and standing does not cause fatigue. It is an excellent trade for former carpenters and other workers in wood, and it is a possible one for any man who has a taste for it and the necessary patience. It is well paid everywhere, in the city and in the country. After an apprenticeship in the trade of a year and a half at Tourvielle, men can start at six or seven francs a day. They can find numerous openings in furniture factories, carriage factories, factories for musical instruments, for aeroplane parts, and for making the interior fittings of railway cars and ships.

The cabinet-making shop at Tourvielle is equipped with a band saw and a rotary moulding cutter, run by electricity—machinery which will be found in almost any factory and with which all cabinet-makers should be familiar. It is hoped that later a plane run by machinery can be added to the equipment. With this simple machinery the foreman has been able to fill orders for many fine pieces of furniture, such as cupboards with sliding doors, desks, period tables, and marquetry boxes, all executed by the apprentices and illustrative of the efficiency of the instruction.

Pupils are taught first to use their tools, then to construct simple articles of furniture and to acquire a knowledge of the different woods. Each man must also learn to make out a bill for his work from working drawings, basing the cost of the job on the price of materials and the amount of his labor. The greatest attention is given to the construction of working drawings, and the art of design is taught in both theory and practice. Varnishing and staining, which are included in the course, can be done by one-armed men, and are sufficiently well paid to induce men to specialize in that kind of work. It is to be regretted, therefore, that the distance of the school from the town and the difficulties of transportation are obstacles in the way of obtaining work. Excellent results in varnishing and staining have been obtained by one-armed men on furniture made in the school shop, but there is not enough of this to afford good practice for many.

Wireless Telegraphy

A wireless telegraphy section was started at Tourvielle as a result of a conversation between M. Herriot and Colonel Ferrié, technical director of wireless telegraphy in the Army. Colonel Ferrié regretted the lack of good operators and at a time when wireless stations were being multiplied so rapidly. "So you want operators?" queried the Mayor of Lyons, "Good! I will provide them."

A few days later, a complete school of wireless telegraphy had been organized at Tourvielle. Pupils were easily recruited; teachers were found in the seventh regiment of engineers, and equipment was obtained from the radio service of Lyons. Without waiting for accommodations to be built, the class started in a little room in the main building which at other times was used as a smoking and reading room. The pavilion afterwards built for the purpose is divided into five rooms— two private rooms for the teachers, a large classroom, a sound-reading room, and an instrument room. Poles and antennæ of the most modern type have been set up outside.

Technical instruction in the subject is supplemented by lessons in dictation, composition, geography, arithmetic, and algebra, given by a

city school teacher, and the whole course of training is supervised by a lieutenant from the wireless station at Lyons. Pupils can also benefit from practical lessons which they are invited to attend at the University, and from access to the Government stations. With such advantages it is needless to say that they make rapid progress. No man is allowed to enter the class unless he has had schooling corresponding to that required for the elementary school certificate.

There have already graduated from the class eighteen young men, each possessing a State diploma obtained by examination. Five are in Morocco in military or civil stations; ten are divided between the Eiffel Tower and the Lyons station; the other three are in coast stations on the Mediterranean and the Atlantic.

The first graduate, a mere boy who was called to the colors in 1916, had been a waiter and was injured in the right thigh and wrist. The second, though only nineteen years old, had been in the war since the beginning and had never had an occupation. The third, also nineteen, was barred from his old job as messenger boy by the loss of his leg at the thigh. The other graduates had been respectively, a bank clerk, a farm hand, a chauffeur, a waiter, a miner, a butcher's boy, a metal worker, a pork dealer, a sailor, a machine tender, a mason, a store clerk, a coachman, and another farm hand.

Horticulture

Agricultural laborers who lost a limb in the early days of the war were firmly convinced that they would never again be able to work on the land. This attitude of mind made difficult the establishment of a horticultural school at Tourvielle, until a campaign had been waged to restore confidence to the *mutilés*. With this object in view a number of private persons, aided by the Army medical service, held demonstrations in numerous villages around Lyons to show the peasants that agricultural work could really be done by men who had suffered amputation. These demonstrations clearly established that a man who has lost a leg or even an arm, can, when provided with a suitable appliance, reap, dig, and plow with a fair degree of efficiency.

The lesser efforts required in horticulture were, then, easily within the reach of disabled men, and many former farm hands were soon glad to avail themselves of the course at Tourvielle. The school does not attempt to teach the main work of a farm, but aims only to train men as keepers or gardeners of country estates, capable of looking after a small piecé of property, of raising vegetables, of pruning a few trees, of laying out flower beds, and at need of caring for rabbits, poultry, and cows.

Artificial limbs and other appliances necessary for this work, which at first were sadly lacking, have been invented in many practical forms. For a man hampered by a wooden leg which sinks into the fresh earth, two modifications of the ordinary peg leg have been devised: one is a wooden leg turned with an enlarged end like an elephant's foot; the other, an idea of Dr. Bouget's, is a *sabot* or wooden sole which can be attached to the bottom of the ordinary wooden leg. For the man whose arm has been amputated, there is a choice of three appliances: the old-fashioned ring and hook, the Jullien tool-holder, and an arrangement of straps devised by Drs. Nové-Josserand and Bouget from photographs of appliances used at Vienna. These straps slip through openings in the point of the appliance sheathing the stump, and can be wound around the handle of any implement. As they permit the handle to be turned in any direction, they are extremely practical for many kinds of work. They are especially useful for pushing a wheel-barrow or drawing a cart.

The most useful all-round working arm for cultivators is probably the tool-holder invented by M. Jullien of Lyons. This consists of a perforated steel cylinder open at one end to receive the handle of the tool, which is fastened firmly in place by a screw through one of the perforations. The other end of the cylinder is attached by a rotary joint to a gimbal joint, which is itself attached by another rotary joint to the stump casing. By means of this system of articulation, a tool guided by the other hand can be moved in any plane and turned on any axis. The Jullien working arm is successfully used by the apprentices at Tourvielle for work with the spade, fork, shovel, pick, rake, and scythe, and is gen-

erally preferred to the old standard ring and hook. However, an improved type of the old hook with an oscillating ring is in other places found very useful.

Appliances perfectly adapted to those more delicate tasks of a horticulturist, such as grafting, budding, and cutting slips, are still to be invented. The Lumière 'universal pincers' are not entirely adequate for this work, nor is the 'vine-grower's hand' invented by Dr. Boureau of Tours, though the latter is the best yet devised for work of this kind. A special appliance for transplanting seedlings, invented by M. Jullien, is used with good results at Tourvielle.

The first pupils in the horticultural section found literally a hard row to hoe. Their experimental gardens were fields of docks and thistles. They had to break the ground, spade it up, and laboriously weed it, before they could lay out their walks and beds, sow their seeds, or plant their shrubs. But they did their work so well that the pupils who came after them found everything ready for a full course in horticulture.

A nursery of 1,500 square meters, containing young quince, almond, and cherry trees, currant bushes, and berry vines, and an orchard of 6,600 square meters give extensive opportunities for teaching tree and fruit culture. In the orchard are three hundred vine stocks, pear and peach trees trained to grow in different forms against a wall, apple and cherry trees, strawberry vines and currant bushes. Flowers are raised in outdoor beds and in a greenhouse, and useful vegetables in all free spaces. There are 5,000 square meters of truck gardens, and ten acres of meadow and pasture. Since pastures are of no use without cows, there were acquired two fine Holland cows which supply the establishment with milk and the horticultural pupils with practice in milking and the care of animals. Raising rabbits for the flesh and for the skins is also carried on.

The period of apprenticeship must usually last through the four seasons, though some pupils with previous experience have been qualified to accept good positions in a shorter time. Two pupils in the class have lost three or four fingers from one hand, a third has had his arm taken off at the shoulder, two others have lost a forearm, one the right and the other the left, and another has atrophy of the right arm. The rest are all injured in the legs.

Conditions of employment vary in different parts of the country. In general a gardener is allowed a lodging for himself and his family, and has the right to grow what vegetables he needs for his own use, often to keep a goat, chickens, or rabbits. He receives in addition from 80 to 100 francs a month, or more if his wife also works on the place. Requests for good gardeners have come to us from all over France.

General Schooling

In 1915 M. Herriot laid down the rule, "The school teacher should be the first instructor engaged by a school for the wounded." Tourvielle has from the beginning had a school teacher, and evening classes in school subjects have been held regularly from seven to eight every evening except Thursdays and Sundays. Classes are formed by grouping the pupils according to their previous education and their needs. The illiterate have lessons in reading, writing, and arithmetic, while the more advanced listen to lectures on different subjects. The following program has been formulated:

French. French is studied through dictations. In these dictations nouns, adjectives, verbs, etc., are successively prominent, and the rules for their agreement and use are brought out one after the other. The authors chosen give an elementary view of French literature, which is supplemented by oral discussion and suggested reading.

History. The history of France, divided into its main periods, is studied from the point of view of the development of civilization. The larger facts of French history are linked with the main facts of general history.

Geography. The natural divisions of France and then of the world are studied by means of an imaginary journey. In each region visited the pupil learns what the tourist can see there, the merchant buy there, the manufacturer make there, in short, the resources and the interesting facts of each country.

Arithmetic. Arithmetic includes addition, subtraction, multiplication, and division, fractions, proportion, the metric system, calculation of

surfaces and volumes, land measuring, mental arithmetic, and the elements of bookkeeping.

Science. Instruction in science is divided into three parts: 1. Scientific questions relating to different trades, as for example, with respect to the leather trade, the tanning process, the action of tannic acid, the source of the best leathers, etc.; 2. The subject of food—nutritive value of different foods, proper diet, etc.; 3. Simple exposition of the great scientific facts.

Hygiene. Lessons in hygiene treat of the different parts of the human body, the functions of the organs, the principles of right living, common causes of sickness and simple remedies, alcoholism, and the venereal diseases.

Progress of the War. Facts gathered from newspapers during the week are correlated, and maps of the different fronts are drawn on the blackboard. Interesting events in foreign countries are discussed.

PRACTICAL RESULTS

To make good workmen and useful citizens was the aim of Mayor Herriot when he organized the Lyons schools for the disabled. The results show that he has succeeded.

On June 15, 1917, 376 disabled men had finished or were still serving an apprenticeship at Tourvielle. Of the 190 pupils still in the school, 54 were shoemakers, 16 galoche-makers, 30 tailors, 16 furriers, 11 cabinet-makers, 27 workers on artificial limbs, 22 wireless operators, and 14 horticulturists. Sixty-nine pupils have left without finishing their course, of whom twenty-eight were sent away for intemperance or misconduct, and forty-one gave up the course for various reasons of their own, such as ill health, family matters, desire for independence, opportunity to return to their former position or to obtain employment without delay. The number of men who have completed their apprenticeship and have either obtained positions or established themselves in their trade is 129, including 60 shoemakers, 8 galoche-makers, 7 tailors, 9 carpenters, 18 wireless operators, 12 artificial limb makers, and 15 horticulturists. These are modest figures, we admit, but they might have been larger if we had been willing to give our apprentices only a rudimentary training, and without adequately arming them against discouragement or failure, had sent them out to take their chance with indulgent employers. Each one of the 129 graduates of Tourvielle is a thoroughly trained workman, an artisan who is master of his trade and knows that he can earn a living in it.

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